

THAT CLAIMED IS:

1. A security vehicle system having a predetermined effective range, the security vehicle system comprising:
  - a remote controller having a control signal
  - 5 emitter positioned to emit a control signal; and
  - a security vehicle having a main body including a front, a rear, first and second sides extending between the front and rear, and a medial body portion having a cargo receiving area adapted to receive cargo, at least
  - 10 one security device connected to the main body, a plurality of omni-directional wheels connected to the main body to provide multi-directional movement of the security vehicle, a control signal receiver connected to the main body and positioned to receive the control
  - 15 signal emitted from the control signal emitter of the remote controller, and at least one drive assembly connected to the main body and to the plurality of omni-directional wheels and responsive to the control signal emitted by the control signal emitter of the
  - 20 remote controller to drive the plurality of omni-directional wheels, the security vehicle having a vertical height less than about twelve inches to thereby define a security vehicle having a low clearance so that the security vehicle can be readily
  - 25 positioned and maneuvered within a predetermined area having a low clearance.

2. The security vehicle system as defined in Claim 1, wherein the main body further comprises a bottom, and a plurality of side walls positioned to extend upwardly from the bottom, and positioned
  - 5 adjacent each of the front, rear, first and second sides, and a top detachably connected to upper peripheries of the side walls.

3. The security vehicle system as defined in  
Claim 2, wherein the cargo receiving area further  
comprises a cavity positioned between the sidewalls  
adjacent the front, rear, and first and second sides of  
5 the main body and wherein the at least one security  
device further comprises at least one surveillance  
device positioned to extend from the cargo receiving  
area to thereby increase the predetermined effective  
range of the security vehicle system.

4. The security vehicle system as defined in  
Claim 3, wherein the side walls of the main body  
further comprise a plurality of security device access  
openings formed therein to thereby provide ready access  
5 of the security device positioned within the cargo  
receiving area to an area positioned exterior the cargo  
receiving area of the cargo receiving area and a  
plurality of security device access opening covers  
positioned to cover each of the plurality of security  
10 device access openings when not in use by the at least  
one security device.

5. The security vehicle system as defined in  
Claim 4, wherein the security vehicle further comprises  
a pair of main axles defined by a front main axle  
positioned closely adjacent the front of the main body  
5 of the security vehicle and a rear main axle positioned  
closely adjacent the rear of the main body of the  
security vehicle, each of the pair of axles including a  
first end positioned adjacent the first side of the  
main body and a second end positioned adjacent the  
10 second side of the main body, and a plurality of omni-  
directional wheel connectors each connected to the  
respective first and second ends of the front and rear

main axles, each including one of the respective first and second ends of one of the pairs of main axles  
15 extending from a medial portion thereof and a plurality of lugs positioned in an annular configuration to surround the main axle extending from the medial portion of the omni-directional wheel connector.

6. The security vehicle system as defined in Claim 5, wherein each of the plurality of omni-directional wheels further comprises a wheel hub formed of a plastic material and including a hub main body  
5 having an axle mount formed in a medial portion thereof and positioned to receive one of the plurality of omni-directional wheel connectors to connect portions of each of the omni-directional wheels to the security vehicle, the hub main body including an outer periphery  
10 portion having a plurality of recesses formed therein, each having a substantially arcuate shaped recessed surface formed therein, and a plurality of pairs of spaced-apart wheel member mounting arms integrally formed of substantially the same plastic material as  
15 the wheel hub and positioned to surround the outer peripheries of the hub main body and extend outwardly therefrom, each of the plurality of pairs of wheel member mounting arms defined by a first wheel member mounting arm having a first predetermined elevation and  
20 a second wheel member mounting arm positioned substantially opposite the first wheel member mounting arm and having a second different predetermined elevation.

7. The security vehicle system as defined in Claim 6, wherein each of the plurality of omni-directional wheels further comprises a plurality of separate and spaced-apart wheel members each formed of

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5 a plastic material including a wheel main body having  
an bulbous shape, a lateral axis, and a longitudinal  
axis being substantially longer than the lateral axis,  
each of the plurality of wheel members being connected  
between the first wheel member mounting arm having the  
10 first predetermined elevation, and the second wheel  
member mounting arm having the second different  
predetermined elevation and within a respective one of  
the plurality of recesses so that each of the plurality  
of wheel members is adapted to operate independently of  
15 other ones of the plurality of wheel members and  
independently of the wheel hub, and a plurality of  
wheel member mounting rods each positioned to extend  
through a medial portion of the wheel main body of each  
of the plurality of wheel members and connected to and  
20 extending between the first and second wheel member  
mounting arms so that each of the plurality of wheel  
members are supported by at least one of the plurality  
of wheel member mounting rods to overlie the respective  
one of the plurality of recesses formed in the main  
25 body of the wheel hub.

8. The security vehicle system as defined in  
Claim 7, wherein the security vehicle further comprises  
a control signal receiver connected to the main body.  
and positioned to receive the control signal emitted  
5 from the remote controller, and a control signal  
encoder positioned in communication with the control  
signal receiver to encode the control signal thereby  
defining an encoded control signal, the security  
vehicle being responsive to the encoded control signal.

9. The security vehicle system as defined in  
Claim 8, wherein the security vehicle further comprises  
a plurality of power units interchangeably connected to

the main body, the at least one drive assembly, the  
5 control signal receiver, and the control signal  
encoder, to provide power to the respective at least  
one drive assembly, the control signal receiver, and  
the control signal encoder.

10. The security vehicle system as defined in  
Claim 9, wherein the security vehicle further comprises  
a track converter positioned to replace the plurality  
of omni-directional wheels with a pair of tracks, the  
5 track converter including a plurality of track  
receiving members, each having a size slightly larger  
than the size of each of the plurality of omni-  
directional wheels and positioned to connect to one of  
the plurality of omni-directional wheel connectors, and  
10 a pair of tracks each positioned to connect between at  
least a pair of track receiving members.

11. The security vehicle system as defined in  
Claim 1, wherein the security device comprises at least  
one of the following: a bomb detection device, a bomb  
disarming device, a fire detection device, a fire  
5 extinguishing device, a poison detection device, a  
poison disabling device, a camera, a listening device,  
and a water purity testing device.

12. The security vehicle system as defined in  
Claim 2, wherein the bottom, top, and side walls of the  
main body further comprise a substantially rectangular  
shape so that the security vehicle has a substantially  
5 rectangular shape.

13. A security vehicle having a predetermined  
effective range and a low vertical height to thereby  
define a low clearance so that the security vehicle can

be readily positioned and maneuvered within a  
5 predetermined area having a low clearance, the security  
vehicle comprising:

a main body having a front, a rear, first and  
second sides extending between the front and rear, and  
a medial body portion having at least one security  
10 device connected thereto, the main body having a  
vertical height less than about twelve inches;

a forward drive unit having a front, a rear, first  
and second sides extending between the front and rear  
positioned adjacent the respective first and second  
15 sides of the main body, the rear of the forward drive  
interchangeably connected to the front of the main body  
so that the forward drive unit is positioned to extend  
from the front of the main body, respective first and  
second omni-directional wheels connected to the  
20 respective first and second sides of the forward drive  
unit, and respective first and second forward drive  
assemblies connected to the respective first and second  
omni-directional wheels to drive the respective first  
and second omni-directional wheels, the forward drive  
25 unit having a vertical height less than about twelve  
inches;

a rear drive unit having a front, a rear, first  
and second sides extending between the front and rear  
positioned adjacent the respective first and second  
30 sides of the main body, the front of the rear drive  
interchangeably connected to the rear of the main body  
so that the rear drive unit is positioned to extend  
from the rear of the main body, respective first and  
second omni-directional wheels connected to the  
35 respective first and second sides of the rear drive  
unit, and respective first and second rear drive  
assemblies connected to the respective first and second  
omni-directional wheels to drive the respective first

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and second omni-directional wheels, the rear drive unit  
40 having a vertical height less than about twelve inches,  
the forward drive unit and the rear drive unit being  
interchangeable so that the rear drive unit can be  
connected to the front of the main body and the forward  
drive unit can be connected to the rear of the main  
45 body; and

a plurality of power units positioned to  
interchangeably connect to the main body, the forward  
drive unit, and the rear drive unit, to provide power  
to the respective first and second drive assemblies of  
50 the respective forward and rear drive units, each of  
the plurality of power units having a vertical height  
less than about twelve inches.

14. The security vehicle as defined in Claim 13,  
wherein the main body further comprises a bottom, and a  
plurality of side walls positioned to extend upwardly  
from the bottom, and positioned adjacent each of the  
5 front, rear, first and second sides, and a top  
detachably connected to upper peripheries of the side  
walls.

15. The security vehicle as defined in Claim 14,  
wherein the cargo receiving area further comprises a  
cavity positioned between the sidewalls adjacent the  
front, rear, and first and second sides of the main  
5 body and wherein the at least one security device  
further comprises at least one surveillance device  
positioned to extend from the cargo receiving area to  
thereby increase the predetermined effective range of  
the security vehicle.

16. The security vehicle as defined in Claim 15,  
wherein the side walls of the main body further

comprise a plurality of security device access openings formed therein to thereby provide ready access of the  
5 security device positioned within the cargo receiving area to an area positioned exterior the cargo receiving area of the cargo receiving area and a plurality of security device access opening covers positioned to cover each of the plurality of security device access  
10 openings when not in use by the at least one security device.

17. The security vehicle as defined in Claim 16,  
further comprising a pair of main axles defined by a front main axle connected between the respective first and second omni-directional wheels of the forward drive  
5 unit, and a rear main axle connected between the respective first and second omni-directional wheels of the rear drive unit of the main body of the security vehicle, the front and rear main axles including a first end positioned adjacent the first side of the  
10 main body and a second end positioned adjacent the second side of the main body, and a plurality of omni-directional wheel connectors each connected to the respective first and second ends of the front and rear main axles and including one of the respective first  
15 and second ends of one of the pairs of main axles extending from a medial portion thereof and a plurality of lugs positioned in an annular configuration surrounding the main axle extending from the medial portion of the omni-directional wheel connector.

18. The security vehicle as defined in Claim 17,  
wherein each of the plurality of omni-directional wheels further comprises a wheel hub formed of a plastic material and including a hub main body having  
5 an axle mount formed in a medial portion thereof and

positioned to receive one of the plurality of omni-directional wheel connectors to connect portions of each of the omni-directional wheels to the security vehicle, the hub main body including an outer periphery  
10 portion having a plurality of recesses formed therein, each having a substantially arcuate shaped recessed surface formed therein, and a plurality of pairs of spaced-apart wheel member mounting arms integrally formed of substantially the same plastic material as  
15 the wheel hub and positioned to surround the outer peripheries of the hub main body and extend outwardly therefrom, each of the plurality of pairs of wheel member mounting arms defined by a first wheel member mounting arm having a first predetermined elevation and  
20 a second wheel member mounting arm positioned substantially opposite the first wheel member mounting arm and having a second different predetermined elevation.

19. The security vehicle as defined in Claim 18, wherein each of the plurality of omni-directional wheels further comprises a plurality of separate and spaced-apart wheel members each formed of a plastic material including a wheel main body having an bulbous shape, a lateral axis, and a longitudinal axis being substantially longer than the lateral axis, each of the plurality of wheel members being connected between the first wheel member mounting arm having the first  
5 predetermined elevation and the second wheel member mounting arm having the second different predetermined elevation and within a respective one of the plurality of recesses so that each of the plurality of wheel members is adapted to operate independently of other  
10 ones of the plurality of wheel members and independently of the wheel hub and a plurality of wheel  
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member mounting rods each positioned to extend through a medial portion of the wheel main body of each of the plurality of wheel members and connected to and  
20 extending between the first and second wheel member mounting arms so that each of the plurality of wheel members are supported by at least one of the plurality of wheel member mounting rods to overlie the respective one of the plurality of recesses formed in the main  
25 body of the wheel hub.

20. The security vehicle as defined in Claim 19, further comprising a control signal receiver connected to the main body and positioned to receive a control signal emitted from a remote controller, and a control  
5 signal encoder positioned in communication with the control signal receiver to encode the control signal thereby defining an encoded control signal, the security vehicle being responsive to the encoded control signal.

21. The security vehicle as defined in Claim 8, wherein the security vehicle further comprises a plurality of power units interchangeably connected to the main body, the forward drive unit, the rear drive  
5 unit, the control signal receiver, and the control signal encoder, to provide power to the respective forward drive assembly, rear drive assembly, the control signal receiver, and the control signal encoder.

22. The security vehicle as defined in Claim 21, further comprising a track converter positioned to replace the plurality of omni-directional wheels with a pair of tracks, the track converter including a  
5 plurality of track receiving members, each having a

size slightly larger than the size of each of the plurality of omni-directional wheels and positioned to connect to one of the plurality of omni-directional wheel connectors, and a pair of tracks each positioned  
10 to connect between at least a pair of track receiving members.

23. The security vehicle as defined in Claim 13, wherein the security device comprises at least one of the following: a bomb detection device, a bomb disarming device, a fire detection device, a fire  
5 extinguishing device, a poison detection device, a poison disabling device, a camera, a listening device, and a water purity testing device.

24. The security vehicle as defined in Claim 14, wherein the bottom, top, and side walls of the main body further comprise a substantially rectangular shape so that the security vehicle has a substantially  
5 rectangular shape.

25. A security vehicle having a predetermined effective range and a low vertical height to thereby define a low clearance security vehicle, the security vehicle comprising:

5 a main body having a bottom, a top, a plurality of side walls extending therebetween, a front, a rear, first and second sides extending between the front and the rear, and a security device connected thereto;

a forward drive unit positioned to detachably and  
10 interchangeably connect to the front of the main body including a plurality of omni-directional wheels and a respective plurality of forward drive assemblies connected to the respective plurality of omni-directional wheels to drive the plurality of omni-

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15 directional wheels;

a rear drive unit positioned to detachably and interchangeably connect to the rear of the main body including a plurality of omni-directional wheels and a respective plurality of rear drive assemblies connected  
20 to the respective plurality of omni-directional wheels so that the forward drive unit can be interchanged with the rear drive unit;

25 a control signal receiver positioned on the main body to receive a control signal emitted from a remote controller;

30 a control signal encoder positioned in communication with the control signal receiver to encode the control signal thereby defining an encoded control signal, the security vehicle being responsive to the encoded control signal; and

35 a plurality of power units interchangeably connected to the main body, the forward drive unit, and the rear drive unit, the control signal receiver, and the control signal encoder, to provide power to the respective plurality of drive assemblies of the respective forward and rear drive units, the control signal receiver, and the control signal encoder.

26. The security vehicle as defined in Claim 25, wherein at least one surveillance device is positioned to extend from the main body to thereby increase the predetermined effective range of the security vehicle  
5 system.

27. The security vehicle as defined in Claim 26, wherein the side walls of the main body further comprise a plurality of security device access openings formed therein to thereby provide ready access of the  
5 security device positioned within the main body to an

area positioned exterior the main body and a plurality of security device access opening covers positioned to cover each of the plurality of security device access openings when not in use by the at least one security  
10 device.

28. The security vehicle as defined in Claim 27, further comprising a pair of main axles defined by a front main axle connected between the respective first and second omni-directional wheels of the forward drive  
5 unit and a rear main axle connected between the respective first and second omni-directional wheels of the rear drive unit of the main body of the security vehicle, the front and rear main axles including a first end positioned adjacent the first side of the  
10 main body and a second end positioned adjacent the second side of the main body, and a plurality of omni-directional wheel connectors each connected to the respective first and second ends of the front and rear main axles and including one of the respective first  
15 and second ends of one of the pairs of main axles extending from a medial portion thereof, and a plurality of lugs positioned in an annular configuration surrounding the main axle extending from the medial portion of the omni-directional wheel  
20 connector.

29. The security vehicle as defined in Claim 28, wherein each of the plurality of omni-directional wheels further comprises a wheel hub formed of a plastic material and including a hub main body having  
5 an axle mount formed in a medial portion thereof and positioned to receive one of the plurality of omni-directional wheel connectors to connect portions of each of the omni-directional wheels to the security

vehicle, the hub main body including an outer periphery  
10 portion having a plurality of recesses formed therein,  
each having a substantially arcuate shaped recessed  
surface formed therein, and a plurality of pairs of  
spaced-apart wheel member mounting arms integrally  
formed of substantially the same plastic material as  
15 the wheel hub and positioned to surround the outer  
peripheries of the hub main body and extend outwardly  
therefrom, each of the plurality of pairs of wheel  
member mounting arms defined by a first wheel member  
mounting arm having a first predetermined elevation and  
20 a second wheel member mounting arm positioned  
substantially opposite the first wheel member mounting  
arm and having a second different predetermined  
elevation.

30. The security vehicle as defined in Claim 29,  
wherein each of the plurality of omni-directional  
wheels further comprises a plurality of separate and  
spaced-apart wheel members each formed of a plastic  
5 material including a wheel main body having an bulbous  
shape, a lateral axis, and a longitudinal axis being  
substantially longer than the lateral axis, each of the  
plurality of wheel members being connected between the  
first wheel member mounting arm having the first  
10 predetermined elevation and the second wheel member  
mounting arm having the second different predetermined  
elevation and within a respective one of the plurality  
of recesses so that each of the plurality of wheel  
members is adapted to operate independently of other  
15 ones of the plurality of wheel members and  
independently of the wheel hub, and a plurality of  
wheel member mounting rods each positioned to extend  
through a medial portion of the wheel main body of each  
of the plurality of wheel members and connected to and

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20 extending between the first and second wheel member  
mounting arms so that each of the plurality of wheel  
members are supported by at least one of the plurality  
of wheel member mounting rods to overlie the respective  
one of the plurality of recesses formed in the main  
25 body of the wheel hub.

31. The security vehicle as defined in Claim 30,  
further comprising a track converter positioned to  
replace the plurality of omni-directional wheels with a  
pair of tracks, the track converter including a  
5 plurality of track receiving members, each having a  
size slightly larger than the size of each of the  
plurality of omni-directional wheels and positioned to  
connect to one of the plurality of omni-directional  
wheel connectors, and a pair of tracks each positioned  
10 to connect between at least a pair of track receiving  
members.

32. The security vehicle as defined in Claim 25,  
wherein the security device comprises at least one of  
the following: a bomb detection device, a bomb  
disarming device, a fire detection device, a fire  
5 extinguishing device, a poison detection device, a  
poison disabling device, a camera, a listening device,  
and a water purity testing device.

33. The security vehicle as defined in Claim 25,  
wherein the bottom, top, and side walls of the main  
body further comprise a substantially rectangular shape  
so that the security vehicle has a substantially  
5 rectangular shape.

34. A method of maneuvering a security vehicle  
having a base with a longitudinal axis, a low

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clearance, and at least one security device connected thereto, the method comprising:

- 5        moving the security vehicle in a first predetermined direction so that the longitudinal axis of the security vehicle is substantially parallel to the path of travel of the security vehicle;
- 10      moving the security vehicle in a second predetermined direction so that the longitudinal axis of the security vehicle is substantially perpendicular to the path of travel of the security vehicle; and
- 15      moving the security vehicle in a third predetermined direction so that the longitudinal axis of the vehicle is substantially transverse to the path of travel of the security vehicle.

35. The method as defined in Claim 34, further comprising maneuvering the security vehicle in a predetermined area having a clearance of less than about twelve inches.

36. The method as defined in Claim 35, further comprising retracting a security device cover to thereby provide access to the security device connected to the security vehicle.

37. The method as defined in Claim 36, further comprising extending the security device to a position away from the security vehicle.

38. The method as defined in Claim 37, further comprising retracting the security device to a position close to the security vehicle.

39. The method as defined in Claim 38, further comprising retracting the security device cover to

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thereby cover the security device connected to the security vehicle.

40. A method of conducting surveillance with a security vehicle having a base with a longitudinal axis, a lateral axis, at least one security device connected thereto, and a predetermined effective range,  
5 the method comprising:

moving the security vehicle in a first predetermined direction so that the longitudinal axis is substantially parallel with a path of travel of the security vehicle and the lateral axis is substantially perpendicular with the path of travel of the security vehicle;  
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extending the at least one security device from the security vehicle to thereby expand the predetermined effective range of the security vehicle;  
15

and

moving the security vehicle in a second predetermined direction so that the longitudinal axis is substantially perpendicular to the path of travel of the security vehicle and the lateral axis is substantially parallel to the path of travel of the security vehicle.  
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41. The method as defined in Claim 40, further comprising moving the security vehicle in a third predetermined direction so that the longitudinal axis and the lateral axis are both substantially transverse  
5 the path of travel of the security vehicle.

42. The method as defined in Claim 41, further comprising retracting the at least one security device to the security vehicle.

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